UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/901,121	07/10/2001	Wei-Sing Chu	2313-115	8944

6449 7590 10/06/2003

ROTHWELL, FIGG, ERNST & MANBECK, P.C.
1425 K STREET, N.W.
SUITE 800
WASHINGTON, DC 20005

EXAMINER	
YANG, NELSON C	

ART UNIT	PAPER NUMBER
1641	

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/901,121	Applicant(s) CHU, WEI-SING	
	Examiner Nelson Yang	Art Unit 1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *11 November 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *38-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *38-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Applicant's cancellation of 1-37 and 70-91 are acknowledged and have been entered

Drawings

2. Color photographs and color drawings are acceptable only for examination purposes unless a petition filed under 37 CFR 1.84(a)(2) is granted permitting their use as acceptable drawings. In the event that applicant wishes to use the drawings currently on file as acceptable drawings, a petition must be filed for acceptance of the color photographs or color drawings as acceptable drawings. Any such petition must be accompanied by the appropriate fee set forth in 37 CFR 1.17(h), three sets of color drawings or color photographs, as appropriate, and an amendment to the first paragraph of the brief description of the drawings section of the specification which states:

> The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the U.S. Patent and Trademark Office upon request and payment of the necessary fee.

3. Color photographs will be accepted if the conditions for accepting color drawings have been satisfied.

Claim Objections

4. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

5. Claim 41 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In claim 38, applicant specifies a method to be performed on a solid phase. In claim 41, however, he broadens the claim to encompass membranes, microarrays and DNA chips as well.

6. Claim 66 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 66 includes the limitation that the ultrasound is produced as a continuous signal. However, in claim 61, the parent claim, the applicant specifically states that the ultrasound is produced in pulses.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 38-69 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 38, the lack of commas after in situ hybridization in line 1 and after Western annealing in line 3 causes the claim to be ambiguous. It is unclear if applicant means immunohistochemistry or in situ hybridization or fluorescent in situ hybridization, or if applicant means immunohistochemistry and either in situ hybridization or fluorescent in situ hybridization. The same applies to part b) regarding a Western annealing or an ELISA.

9. The division of claim 38 into parts a) and b) further renders the claim indefinite. It is unclear if the use of the ultrasound only applies to part b) or if it is in reference to the entire claim. Furthermore, it is unclear the purpose behind the division of the claim into two parts.

10. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481

(Bd. App. 1949). In the present instance, claim 41 recites the broad recitation solid phase, and the claim also recites microarray, membrane, and DNA chip, which are narrower statements of the range/limitation. This also applies to claims 45, 54-57, and 69. Furthermore, applicant has defined in claim 39 that a solid phase is a tissue section, tissue microarray, or a chip. Although claims 41, 45, 54-57, and 69 are not dependent on claim 39, they include the broad limitation "solid phase" as well as the narrower limitations, rendering the definition of the phrase "solid phase" unclear and ambiguous.

11. Regarding claims 66-68, applicant specified the limitation that the ultrasound be produced in pulses in the parent claim (claim 61). This renders claim 66 unclear and ambiguous, as it specifies the limitation that the ultrasound produced be a continuous signal.

12. The remainder of the claims are deemed indefinite due to their dependence on an indefinite claim.

Claim Rejections - 35 USC § 112

13. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

14. Claims 38, 39, 41, 45, 54-57, 69 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the

claimed invention. Specifically, applicant does not specifically mention or define the term "solid phase" in the specification. Although he mentions examples of solid phases such as DNA chips or tissue microarrays, these are narrower limitations of the term and are not sufficient.

15. Claims 50 and 52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. While applicant discloses the use of transducers with multiple heads and the use of multiple transducers, no mention of the added limitation of producing different intensities with the different heads and different transducers is found in the specification.

16. Claims 64 and 65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. While applicant discloses the use of ultrasound produced in pulses in the specification, no mention of the added limitation of varying the pulses in frequency and intensity is found within the specification.

17. Claims 50, 52, 64 and 65 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains,

or with which it is most nearly connected, to make and/or use the invention. It is unclear why the limitations of multiple heads of transducer producing different ultrasound intensities, multiple transducers producing different ultrasound intensities, varying the pulses in frequency and intensity are important, and applicant fails to teach in the specification why these limitations are necessary to use the invention.

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. Claims 38-40, 43, 45-48, 56, 58-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Lanza et al [US, 5,958,371]. Lanza et al teaches a method of performing hybridization on a solid phase using ultrasound with a frequency of at least 100 KHz. Specifically, Lanza teaches a method of performing hybridization on nitrocellulose membranes using ultrasound, with ultrasonic transducers suitable for biomedical and diagnostic applications within a frequency range of 5 to 50 MHz (column 7, lines 35-64).

20. With respect to claim 39, the solid phase is a tissue section. Specifically, the method is performed on a tissue surface (column 7, lines 35-40).

21. With respect to claim 40, the hybridization, annealing, or ELISA is performed on a membrane (column 7, lines 55-60).

22. With respect to claim 43, the frequency range used by Lanza et al is 5 to 50 MHz, which falls within the range of 100 KHz – 50Mhz (column 7, lines 35-64).

23. With respect to claim 45, the method is performed on a solid phase, where one or more ultrasound transducers are used to produce an ultrasound field (column 7, lines 35-64).

24. With respect to claim 46, Lanza et al teaches the use of a transducer that produces ultrasound (column 7, lines 35-64). Since the transducer head is simply the part of the transducer containing the transducer elements (see Kretz (US 4403509]), a person of ordinary skill in the art would clearly realize that the transducer Lanza et al teaches would be comprised of at least one head.

25. With respect to claim 47 and 48, Lanza et al teaches the use of a transducer that produces a broadband, or wideband, frequency (column 7, lines 55-64). Since the transducer head is simply the part of the transducer containing the transducer elements (see Kretz (US 4403509]), a person of ordinary skill in the art would clearly realize that the transducer Lanza teaches would inherently be comprised of at least one head.

26. With respect to claim 56, the method is performed on a solid phase that is rotated (column 10, example 4, column 17-18, example 10).

27. With respect to claim 58 and 60, the ultrasound is a continuous wideband frequency in the range of 0.1-50 MHz (column 7, lines 55-64).

28. With respect to claim 59, the ultrasound is a single frequency in the range of 0.1-50 MHz, specifically a 7.5 MHz focused transducer (column 9, example 3).

29. With respect to claim 61, the ultrasound is produced in pulses. Specifically, the ultrasound is operated in a pulse-echo mode (column 9-15, examples 4-7).

30. With respect to claim 62, Lanza et al teaches the use of a 7.5 MHz linear phased array transducer (columns 15-17, examples 8-9). Although Lanza et al doesn't specifically mention that the transducer produces pulses, a person of ordinary skill in the art would know that linear phased array transducers are composed of several hundred elements, with subgroups of adjacent elements producing pulses simultaneously.

31. With respect to claim 63, the ultrasound is produced as a wideband frequency in the range of 0.1-50 MHz. Specifically, the ultrasound is produced at 30-60 MHz (column 9-15, examples 4-7).

32. With respect to claim 64, the pulses vary in frequency in the range of 0.1-50 MHz (5-15 MHz) (column 14-15, example 7).

Claim Rejections - 35 USC § 103

33. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

34. Claims 41, 42, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanza et al [US 5,958,371] in view of Gravlee, Jr [US 3,961,097]. The method of Lanza et al as disclosed above fails to recite the specific feature of ultrasound receiving power in the range of

0.01-100 W/cm^2. However, Gravlee, Jr. teaches that the intensity of ultrasound must be maintained at a level below the level at which damage to cells in the tissue occurs. It would have been obvious for a person of ordinary skill in the art to use an ultrasound receiving power within this particular range in order to avoid damaging the sample, because it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value of a result effective variable. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation." Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. At 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-219 (C.C.P.A. 1980). Since applicant has not disclosed that the specific limitations recited in instant claims 41, 42, and 69 are for any particular purpose or solve any stated problem and the prior art teaches that improved noninvasive method for forming an acoustic contrast agent which can be targeted in vitro or in vivo and which when bound to a specific desired site alters the acoustic reflectivity of a tissue surface or support media in a manner detectable using ultrasonic transducers, absent unexpected results, it would have been obvious for one of ordinary skill to discover the optimum workable ranges of the methods disclosed by Lanza et al by normal optimization procedures known in the art in order to avoid damaging the sample.

35. Claims 44, 51, 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanza et al [US 5,958,371], in view of Blank [US 5,913,826] and Lang et al [US 5,941,825]. Lanza et al teaches a method involving the use of transducers to produce ultrasound (column 7, lines 35-64). Lanza et al does not specifically teach the use of two or more transducers to produce ultrasound. Blank, however, teaches the use of a multipe transducer array in order to fit a three-dimensional contour (column 13, lines 19-29). Lang et al further teaches that the ultrasound system can contain three ultrasound sources transmitting at three different frequencies and separated by predetermined distances. Detection of returning signals can include sampling of all the returning frequencies at all detector sites, which effectively allows each ultrasound source to be coded and the returning signals can be identified with a particular ultrasound source. This permits greater refinement of reflective distances because the reflective distance from each ultrasound source is separately detected at each detector, which facilitates signal averaging and can optionally provide a basis of triangulation between different ultrasound sources and the reflective interfaces in order to verify reflective distances. This essentially permits detection from multiple reflective angles (column 24, lines 1-20). Therefore it would be obvious to use two or more transducers in the method disclosed by Lanza et al, in order to fit a three-dimensional contour or to permit detection from multiple reflective angles.

36. With respect to claim 51, although Lanza et al does not teach the step of having each transducer produce a different frequency, Lang et al teaches that ultrasound sources transmitting at different frequencies permits greater refinement of reflective distances because the reflective distance from each ultrasound source is separately detected at each detector, which facilitates

signal averaging and can optionally provide a basis of triangulation between different ultrasound sources and the reflective interfaces in order to verify reflective distances (column 24, lines 1-20). Therefore, it would be obvious to produce different ultrasound frequencies in the method of Lanza et al, in order to permit detection from multiple reflective angles.

37. With respect to claim 53, Lanza et al teaches the application of a range of frequencies to a sample (column 14-15, example 7).

38. With respect to claim 54, Lanza et al discloses a method where the transducers are arranged in a two-dimensional arrangement (columns 9-17, examples 4-9)

39. With respect to claim 55, although Lanza et al does not disclose a method where the transducers are arranged in a three-dimensional arrangement, Blank teaches it would be obvious to use multiple transducers in order to fit a three-dimensional contour. Therefore, it would be obvious to use multiple transducers arranged in a three-dimensional arrangement in the method disclosed by Lanza in order to fit a three-dimensional contour.

40. Claims 46-49, and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lanza et al [US 5,958,371], in view of Kretz [US 4,403,509]. While Lanza et al teaches the use of a transducer comprising of a head to produce ultrasound, he does not teach the use of a transducer with multiple heads (column 7, lines 35-64). Kretz, however, teaches that the use of multiple transducer heads will allow the entire image to have a higher resolution. (column 3, lines 7-30). Therefore it would be obvious to use a transducer with multiple heads in the method disclosed by Lanza et al, in order to achieve an image with higher resolution.

41. With respect to claims 47 and 48, Lanza et al teaches the use of transducers capable of emitting wideband frequency (columns 9-17, examples 4-9).

42. With respect to claim 49, although Lanza et al does not teach the use of multiple heads producing different frequencies, Kretz teaches that sound at different frequencies may be used for an examination at different depths. Particularly, regions near the surface may be examined with sound at higher frequencies than regions at larger depths. Higher sound frequencies will inherently involve a higher resolution and will also involve a lower depth of penetration into the object, which may consist of organic tissue. That lower depth of penetration may be desirable in such case as it will help to avoid ghost echoes (column 3, lines 21-47). Therefore it would be obvious to use a transducer comprising of multiple heads producing different frequencies in the method of Lanza et al, in order to allow for examination at different depths, and to avoid ghost echos.

43. With respect to claim 57, although Lanza et al teaches the use of a solid phase and a transducer (column 7, lines 35-64), he does not teach that the step of rotating the transducer around the solid phase. Kretz, however, teaches that if the wheel is rotated at constant speed and each group consists of the same number of sound transducer heads, the sound transducer heads of the group designed in accordance with the invention may be used to produce section images having a high lateral resolution. Therefore, it would be obvious to rotate the transducer in the method of Lanza et al, in order to produce section images having a high lateral resolution.

Conclusion

44. No claims are allowed.

45. The following references are also cited as art of interest: Anderson et al [US 6,197,595], Coppleson et al [US 5,800,350], Drmanac et al [US 6,383,742 B1], Drmanac et al [US 6,401,267], Francis et al [US 6,524,795 B1], Iino et al [US 5,944,665 A], Knoll [US 6,548,311 B1], Virtanen [US 6,342,349 B1], Tachibana et al [US 6,176,842], Bradfield [*Ultrasonic Transducers 1. Introduction to ultrasonic transducers, Part A*, Ultrasonics, April 1970, 8(2), pgs 112-23].

46. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson Yang whose telephone number is 703-305-4508. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long V Le can be reached on 703-305-3399. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

NY

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600
09/29/03